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Causal Attributions of Nontraditional Students in a Developmental Mathematics Course at a Two-Year College

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The University of Southern Mississippi

CAUSAL ATTRIBUTIONS OF NONTRADITIONAL STUDENTS
IN A DEVELOPMENTAL MATHEMATICS COURSE
AT A TWO-YEAR COLLEGE

by

Jacob Dasinger

Abstract of a Dissertation
Submitted to the Graduate School
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

December 2011

ABSTRACT

CAUSAL ATTRIBUTIONS OF NONTRADITIONAL STUDENTS

IN A DEVELOPMENTAL MATHEMATICS COURSE

AT A TWO-YEAR COLLEGE

by Jacob Arthur Dasinger

December 2011

The purpose of this study was to determine if a relationship existed between exam grades and students' causal attributions of their grades in a developmental mathematics course at a community college. Also investigated were differences in causal attributions of grades between Traditional and Nontraditional students. In addition, among Nontraditional students, differences based on gender were examined. The sample consisted of 331 completed questionnaires from 24 sections at a southern community college in the Spring 2010 semester.

The instrument used was a self-report questionnaire consisting of four parts: (a) demographic data section; (b) seven questions to determine students' classification; (c) short answer section about students' exam grade, and an attribution for the exam grade; (d) Revised Causal Dimension Scale (CDSII). A Pearson chi-square test was conducted between low-graded and high-graded students to test for a relationship between exam grade and reported attributions. Multivariate Analysis of Variance (MANOVA) was performed between student classifications, based on exam grade and scores on the CDSII to test for any relationships. Multivariate Analysis of Variance was also performed between gender of Nontraditional students and scores on the CDSII.

The statistical analysis indicated a difference in reported attributions of low-graded and high-graded students. Low-graded students' reported attributes were spread across the eight categories while high-graded students attributed Internal-Stable-Controllable and Internal-Unstable-Controllable attributes most frequently. This overall trend appeared in all student classifications but Minimally Nontraditional students. Reported attributes for this group were scattered over the eight categories regardless of exam grade.

On the CDSII, neither low-graded students nor high-graded students showed significant differences in Locus of Causality or Stability dimensions when distinguished by student classification. For low-graded students, there was a significant difference in the Personal Controllability dimension. For high-graded students, a significant difference appeared in the Personal Controllability dimension and the External Controllability dimension. When compared by gender, low-graded Nontraditional students differed on the CDSII in the Locus of Causality dimension, with females attributing their grade more towards internal traits as compared to males. Among high-graded Nontraditional students, there was no significant difference in any of the dimensions.

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Approved:

Director

Dean of the Graduate School

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DEDICATION

I dedicate this dissertation to my late grandfather, Arthur L. Wolf. It was very important to him for his children and grandchildren to attend college. He worked all of his life and saved, so my sister and I could have the opportunity of receiving a higher education. Without his tireless effort and preparations, none of this could have been possible.

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CHAPTER I

INTRODUCTION

President Obama has declared community colleges will be critical in achieving his goal for the United States to have the highest college attainment rate in the world by the year 2020 (Vandal, 2009). Community colleges offer under-represented populations, in particular, older and/or returning students, a greater chance at higher education, either through associate degrees or by providing foundations for transfer to four-year universities. According to Kraemer (1996), students' mathematics abilities have an impact on whether they will graduate from community college or transfer and graduate from a four year university. Having more returning, older students graduate with bachelor's degrees is vital to fill the increasing demand for jobs in the areas of science, mathematics, engineering, and technology.

The National Center for Education Statistics (2010A) reported between 1995 and 2006, enrollment of people 25 and older at degree-granting institutions increased by 13 percent and is predicted to rise by 19 percent between 2006 and 2017. These students are often referred to as nontraditional. According to the NCES (2010B), a Nontraditional student is defined as a student who falls into one of the following categories:

- (a) a student who does not enter postsecondary school in the same calendar year as graduating high school;
- (b) a student who attends part-time;
- (c) a student who works full-time (35 hours or more) while enrolled;
- (d) a student who is considered financially independent when evaluated for financial aid;

- (e) a student who has dependents other than a spouse;
- (f) a student who is a single parent;
- (g) a student who does not have a high school diploma (obtained GED or completion certificate) (p.1).

Horn and Carroll (1996) further characterized Nontraditional students as belonging to one of three categories: Minimally Nontraditional, Moderately Nontraditional or Highly Nontraditional. A Minimally Nontraditional student is a student who has only one of the above characteristics. A Moderately Nontraditional student is a student who has two or three of the above characteristics. A Highly Nontraditional student is a student who has four or more of the above characteristics.

More often than not, Nontraditional students begin their college careers at community colleges as opposed to universities (Choy, 2002; Robert, 2010). Community colleges tend to offer more flexible class schedules and better tuition rates when compared to larger universities. However, Nontraditional students experience the same obstacles the college environment presents traditional students, on top of extraneous circumstances, such as full-time jobs and children. These added obstacles can lead to fewer courses taken per semester and to a phenomenon known as stopping-out, which occurs more often in older students (Grosset, 1993). Despite these obstacles, adult students tend to have better time-management skills, similar studying habits and, overall, do not suffer from intellectual deficiency when compared to younger students. (Richardson & King, 1998).

The relationship between attitude and achievement of Nontraditional mathematics students has been explored by mathematics educators (Bretscher, Dwinell,

Heyl, & Higbee, 1989; Goolsby, 1987; House, 1995). Gupta, Harris, Carrier, and Caron (2006) found older students who had a more positive attitude towards mathematics tended to do better in their college mathematics classes than did younger students. This finding led the authors to believe adult students enter college with a “sense of urgency and readiness to learn” (pg.6). Wheat, Tunnell, and Munday (1991) also determined a student’s age positively correlated with grades in a college algebra course. However, research examining what Nontraditional students attribute achievement or failure to in mathematics is not as extensive.

The study of an individual’s reasoning for succeeding or failing at a particular task is called causal attribution theory. Attribution theory has been used to explain the relationship between student beliefs of success and failure and academic achievement (House, 2003; Kivilu & Rogers, 1998; McMillian & Forsyth, 1981, as cited in Cortés-Suárez & Sandiford, 2008). Little to no research has been done in which attribution theory is applied specifically to Nontraditional students, to developmental mathematics, or to a combination of the two. Since at least half of all Nontraditional students will be placed into developmental mathematics courses at one point in their college careers (Twigg, 2005), it is important to get a better understanding of how this population attributes success or failure in mathematics and how these outcomes occur in their opinions. If there is a difference in attribution styles between traditional and Nontraditional students, then measures could be taken in order to adapt teaching styles and learning environments to the different populations.

Understanding factors that impact success is important in all mathematics courses, especially developmental mathematics. Success in developmental mathematics has been

shown to lead to success in later mathematics courses such as College Algebra, a common requirement of most college majors (Head & Lindsey, 1984; Johnson, 1996; Penny & White, 1998; Waycaster, 2001; Wheland, Konet, & Butler, 2003). Placement in a developmental mathematics course is done with the purpose of providing a solid foundation which will allow a better chance at success in a course like College Algebra (Hagedorn, Siadat, Fogel, Nora, & Pascarella, 1999). However, the mathematical background of students in developmental mathematics is often so deficient that high failure rates in these courses still exist (Adelman, 1995). Also, placement in developmental mathematics put students behind in their graduation schedule, requiring them to stay in college longer than planned. Berkovitz and O'Quin (2006) claim the only significant demographic variable which predicts college graduation is age, with younger students being more likely to graduate than older students. If the student fails a developmental course, time will be added to his or her schedule as these courses are usually offered sequentially, with admission into the next course dependent on passing the previous one. This additional time adds to the likelihood of the student growing more frustrated with a graduation date that keeps getting pushed back. Helping determine attributions of success and failure of Nontraditional students can help structure a learning environment in which more students are likely to succeed and continue onward toward any mathematics requirements they might have.

Statement of the Problem

The problem addressed in this research was whether or not a relationship existed between exam grades and student attributions of an exam grade in a developmental mathematics course. The research determined if the attributions of Nontraditional

students differed from those of Traditional students. Also, the research examined if these attributions differed among Nontraditional students by gender.

Purpose of the Study

The purpose of this study was to determine if a relationship existed between exam grades and students' causal attributions of an exam grade in a developmental mathematics course, Intermediate Algebra, at a community college. This study also looked at the differences in causal attributions of grades between Traditional and Nontraditional students. In addition, differences based on gender were examined among Nontraditional students. This study involved the independent variables of student classification (Traditional, Minimally Nontraditional, Moderately Nontraditional or Highly Nontraditional) and exam grade classification (low or high) on a single test. The dependent variables were students' causal attribution scores measured by the Revised Causal Dimension Scale (McAuley, Duncan, & Russell, 1992). A second analysis was done with only Minimally Nontraditional, Moderately Nontraditional, and Highly Nontraditional students using gender as the independent variable and student's causal attribution scores as the dependent variable.

Research Questions and Hypotheses

This study examined the relationship between students' causal attribution scores of an exam in a developmental mathematics course Intermediate Algebra at a two-year college. The following research questions were investigated:

1. Is there a relationship between reported attributions of Traditional and Nontraditional (Minimally, Moderately, Highly) students and an exam grade in a developmental mathematics course?

2. Do differences exist between Nontraditional (Minimally, Moderately, Highly) and Traditional students' causal attribution scores of a low exam grade in a developmental mathematics course?
3. Do differences exist between Nontraditional (Minimally, Moderately, Highly) and Traditional students' causal attribution scores of a high exam grade in a developmental mathematics course?
4. Do differences exist based on gender in Nontraditional (Minimally, Moderately, Highly) students' causal attribution scores of a low exam grade in a developmental mathematics course?
5. Do differences exist based on gender in Nontraditional (Minimally, Moderately, Highly) students' causal attribution scores of a high exam grade in a developmental mathematics course?

Statistical analysis will be used on the following hypotheses:

1. There will be a statistical relationship between high-graded and low-graded students' causal attributions to exam grades.
2. There will be no statistical difference in causal attribution scores between Traditional and Nontraditional (Minimally, Moderately, Highly) students who report a low grade on a developmental mathematics exam.
3. There will be no statistical difference in causal attribution scores between Traditional and Nontraditional (Minimally, Moderately, Highly) students who report a high grade on a developmental mathematics exam.
4. There will be no statistical difference based on gender in causal attribution scores of Nontraditional (Minimally, Moderately, Highly) students who report a low grade

on a developmental mathematics exam.

5. There will be no statistical difference based on gender in causal attribution scores of Nontraditional (Minimally, Moderately, Highly) students who report a high grade on a developmental mathematics exam.

Assumptions

1. All respondents will be as honest and accurate as possible when completing the questionnaire.

Delimitations

1. Respondents will be limited to 24 sections of Intermediate Algebra in the Spring 2011 semester at a community college in southern Mississippi.
2. Not all of the respondents will have taken the same exam when asked to rate their attributions.

Definition of Terms

1. *Controllable attributions* – attributes which one can control (e.g. study habits, test preparation, instructor bias, tutors/friends).
2. *External attributions* – attributes outside of oneself (e.g. school requirements, instructor bias, luck, tutor/friends).
3. *Full-time student* – student who is currently enrolled in 12 semester hours or more
4. *High grade* – exam grade which was reported 80% or above.
5. *Highly Nontraditional student* - Using Horn and Carroll's (1996) definition, this will be a student who has four or more characteristics as defined by NCES (2010B).
6. *Internal attributions* – attributes within oneself (e.g. aptitude, test preparation, health, overall study habits).

7. *Low grade* – exam grade which was reported 69% or below.
8. *Minimally Nontraditional student* – Using Horn and Carroll's (1996) definition, this will be a student who has one characteristic as defined by NCES (2010B).
9. *Moderately Nontraditional student* - Using Horn and Carroll's (1996) definition, this will be a student who has two or three characteristics as defined by NCES (2010B).
10. *Part-time student* – student who is currently enrolled in fewer than 12 semester hours.
11. *Stable attributions* – fixed attributes; attributes unlikely to change (e.g. aptitude, overall study habits, school requirements, instructor bias).
12. *Traditional student* – Using Horn and Carroll's (1996) definition as a guide, this will be a student who has zero characteristics as defined by NCES (2010B).
13. *Uncontrollable attributions* – attributes which one cannot control (e.g. aptitude, health, school requirements, luck).
14. *Unstable attributions* – attributes which can change at any given time (e.g. health, test preparation, luck, tutors/friends).

Justification of the Study

This study was performed to determine the causal attributions of success and failure of Nontraditional students in a developmental mathematics class, and if these attributions differ from those of Traditional students. Also explored was the possibility of causal attributions differing among Nontraditional students based on gender. Every semester, more Nontraditional students are returning to college in order to further their career opportunities. These students may have been out of school for several years and

are being asked to pick up right where they left off in their previous education setting. Hence, more returning students are being placed in remediation, especially in mathematics. If a relationship can be determined between students' attributions and grades, this will help educators create a learning environment more suitable to the students. Also, if the students' attributions differ between Traditional and Nontraditional students, measures need to be taken in order to address the differences and to help guarantee higher rates of success in college mathematics courses.

Determining the attribution styles of Nontraditional students could also lead to breaking the belief of "learned helplessness." Seligman (1975) (as cited in Parsons, Meece, Adler, & Kaczala, 1982) states learned helplessness follows from a perception of little or no control over aversive events. Abramson, Seligman, and Teasdale (1978) suggest the attributions a person makes for the perceived lack of control are vital predictors of learned helplessness. People who attribute failures to internal, stable factors (lack of ability) often showed an increase in the perception of learned helplessness while people who attribute failures to stable, external factors (task difficulty) or unstable, internal factors (lack of effort) tended to show no increase in learned helplessness. Students who attribute success to ability and failure to lack of effort tend to have higher achievement motivations for future tasks while the reverse is true for those who attribute failure to lack of ability and success to factors, such as luck. If uninterrupted, this second pattern could lead to an overall lack of effort and motivation on future tasks (Seegers, Van Putten, Vermeer, 2004). Understanding which attribution styles are predominant among Nontraditional students will help in the identification and disruption of learned helplessness.

CHAPTER II

REVIEW OF THE LITERATURE

The purpose of this study was to examine the relationship between Traditional and Nontraditional students' grades on an exam in a developmental mathematics course and the causal attributions given by the students. This study was also interested in gender-based differences in causal attributions of Nontraditional students in a developmental mathematics course. In this literature review, there are several areas explored. First, causal attribution will be explained in more detail as the theoretical framework for the study. Second, research is presented on the use of causal attribution theory in the collegiate mathematics setting, with some studies focusing on gender differences. Third, studies are examined pertaining to Nontraditional students' successes in mathematics courses, particularly in developmental mathematics courses. Last, the importance of developmental mathematics and subsequent success in college-credit courses are explored. This review provides the framework for the study and allows identification of lapses in previous research.

Attribution Theory

Weiner (1986) describes attribution of causality as “an assignment of responsibility... [which] is imposed or inferred by an attributor” (pg. 22). Causal attribution theory is the study of how people explain positive and negative occurrences in their lives. Following the result of an outcome, a motivational sequence is initiated by the subject. The motivational sequence is one in which the subject searches for causality of the said outcome, particularly when the outcome is unexpected, negative or important. The causality one determines for a particular outcome is dependent on the person's

beliefs about oneself and the situation given.

Attribution theory first appeared in the work of Fritz Heider. Heider (1958) described the distinction of causes for events to fall into one of two categories: causes that can be attributed to the person and causes that can be attributed to the environment. This *Locus of Causality* is the first causal dimension and has been further identified as internal and external; internal causes are within the person (ability, effort, etc.) while external causes are outside of the person (environment, tasks, etc.).

Weiner, Frieze, Kukla, Reed, Rest, & Rosenbaum (1971) identified a second causal dimension based on the idea internal and external causes can fluctuate in some opinions while remaining relatively constant in others. This new dimension is referred to as *Stability*. With this new dimension, along with Locus of Causality, Weiner et al. (1971) categorized the four most dominant achievement-related contexts (ability, effort, task difficulty and luck) in a 2 x 2 matrix as shown in Table 1.

Table 1

Weiner's 2 x 2 matrix of four most dominant achievement-related contexts

	Internal	External
Stable	Ability	Task Difficulty
Unstable	Effort	Luck

From "Perceiving the causes of success and failure," by Weiner, B., Frieze, I.H., Kukla, A., Reed, L., Rest, S., & Rosenbaum, R.M., 1971.

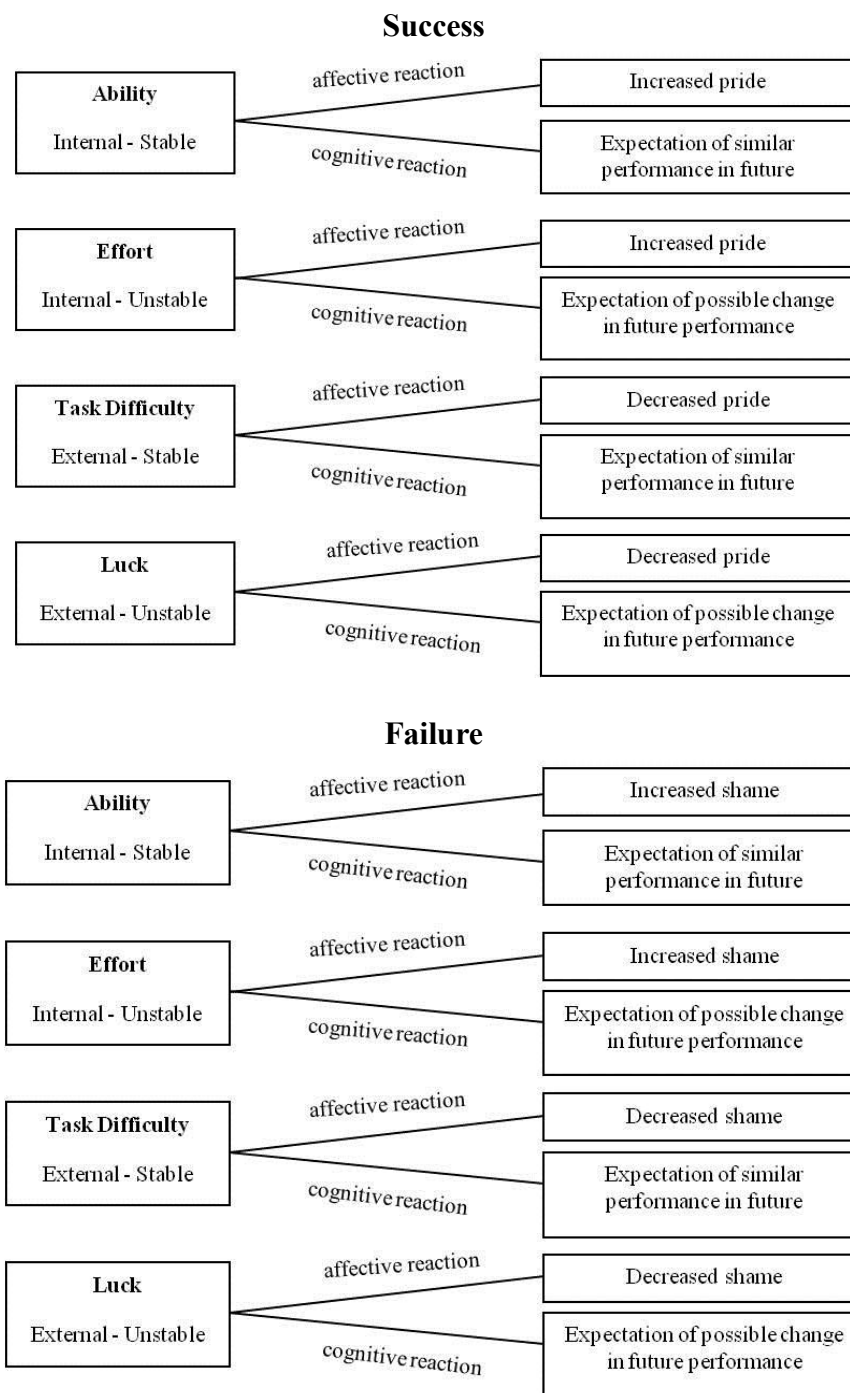
According to Bar-Tal (1978), the Locus of Causality dimension influences the affective reactions in people while the Stability dimension influences affective cognitive changes. If people succeed due to ability or effort (both internal attributes), they will

have a sense of increased pride, more so than if they felt success came from luck or task difficulty. Opposite responses are expected if one fails due to ability or effort. The person will feel increased shame, and less so if the failure resulted because of task difficulty or luck.

While the Locus of Causality dimension influences affective reactions, the Stability dimension affects the cognitive reactions in people (Bar-Tal, 1978). If one perceives success or failure due to stable factors of ability or task difficulty, he or she will expect the same result in future performance. If one feels success or failure came as a result of unstable factors like luck or effort, different results could occur at other times. Figure 1 summarizes the above:

Figure 1

Affective and cognitive reactions in situations of success and failure as a function of attributions



From "Attributional Analysis of Achievement-Related Behavior," by Bar-Tal, D., 1978, *Review of Educational Research*, 48(2), p. 261.

However, Weiner (1986) has since changed these four contexts to a less ambiguous scheme as shown in Table 2.

Table 2

Weiner's Locus \times Stability classification scheme

	Internal	External
Stable	Aptitude	Objective task characteristics
Unstable	Temporary exertion	Chance

From "An Attributional Theory of Motivation and Emotion," by Weiner, B., 1986, p. 47.

According to Weiner (1986), a third causal dimension has been identified as needed to help explain miscellaneous reasons, such as fatigue, mood, and other temporary effects that may contribute to a particular outcome. This new causal dimension, called *Controllability*, can be applied to both internal and external causes. An example of internal and external causes of success and failure classified according to Locus of Causality, Stability, and Controllability are present in Table 3.

Table 3

Examples of perceived causes on the basis of Locus \times Stability \times Controllability classification scheme

Dimension Classification	Achievement
Internal - Stable - Uncontrollable	Aptitude
Internal - Stable - Controllable	Overall study habits
Internal - Unstable - Uncontrollable	Health
Internal - Unstable - Controllable	Test preparation
External - Stable - Uncontrollable	School requirements
External - Stable - Controllable	Instructor bias
External - Unstable - Uncontrollable	Chance
External - Unstable - Controllable	Tutors/friends

Modified from “An Attributional Theory of Motivation and Emotion,” by Weiner, B., 1986, p. 51.

When interpreting success and failure, a person’s causal bias has been shown to influence achievement striving. In similar experiments conducted by Weiner and Kukla (1970) and Kukla (1972), subjects were asked to correctly determine the next number (either 0 or 1) in a sequence of digits. What was unknown to the subjects was the next number could not be determined by any means; correct or incorrect answers were strictly by chance. Students deemed ‘high-ability’ tended to attribute success to ability and effort, and failure to lack of effort. Students deemed “low-ability” attributed success to luck and failure to lack of ability. This is important because of where these causes lie in the attribution model above. “High-ability” students attribute failure to lack of effort - an

internal, unstable, controllable attribution. These students see failure at a task as something they could have prevented and something that can be prevented in the future. “Low-ability” students attribute failure to lack of ability – an internal, stable, uncontrollable attribution. These students feel failure is something that they cannot control, no matter how much effort is exerted (Weiner, 1972).

Attribution Theory in Mathematics

Elliot (1990) performed a study in which he investigated if the relationship between causal attribution, confidence in learning mathematics, and perceived usefulness of mathematics and mathematics achievement was different for Nontraditional and Traditional college males and females. A total of 140 students (35 nontraditional female, 35 nontraditional male, 35 traditional female, 35 traditional male) were randomly selected from a basic algebra class at several campuses in Maine. Traditional students were classified as 18 – 20 years old while Nontraditional students were deemed over 25 years of age. These students were given a pre-test and the Causal Attribution Scale, and a post-test at the end of the semester. For Nontraditional female students, step-wise regression showed the only significant predictors for post-test achievement were the pre-test scores and success due to luck. For the Nontraditional male students, the pre-test scores and failure due to effort were the only significant predictors of post-test achievement. For both male and female Traditional students, the only significant predictor of post-test achievement was pre-test scores. This finding tends to lean towards the idea causal attributions could attribute more to mathematics success for Nontraditional students than Traditional students.

Cortés-Suárez and Sandiford (2008) studied the differences between the attributions given by passing and failing students in a college algebra course. A total of 410 students from a large urban community college were asked to self-report their performance after an in-class exam. Students were then given open-ended questions asking them to state the cause of their performances on the test, which were later coded according into one of four categories: ability, effort, task difficulty and luck. After providing the cause, the students used the Revised Causal Dimensions Scale (CDSII) asking them to explain their provided attribution along the dimensions of Locus of Causality, Stability, Personal Controllability and External Controllability.

Analysis of the coded open-ended questions revealed passing students attributed their successes to effort and ability more often while failing students attributed their failures to effort, ability, and task difficulty. A statistically significant relationship appeared between the total number of students attributing success or failure to effort and ability. Results of the CDSII showed significant differences between the passing and failing groups in the dimensions of Locus of Causality, Stability and Personal Controllability. Students in the passing group attributed their success in the direction of internality, Stability, Personal Controllability and External Controllability. Students in the failing group attributed their failures in the direction of externality, instability, other than personal controllability, and external controllability. The researchers did not look at differences in attributions based on student classifications of Traditional and Nontraditional students. Also, the researchers only categorized the open-ended student responses along four dimensions (ability, effort, task difficulty and luck) as opposed to the eight dimensions defined by Weiner (1986).

Attribution Theory in Mathematics by Gender

Wolfe, Pedro, Becker, and Fennema (1980) tested causal attribution theory in mathematics and examined the effects of level of mathematics achievement, sex and the interactions of level of mathematics achievement and sex on attribution patterns. The subjects of the study were 647 female and 577 male high school students enrolled in college preparatory algebra and geometry classes. The students were given an achievement test to measure performance in mathematics (two different tests were given: one for algebra students and one for geometry students). The Mathematics Attribution Scale (MAS) was used to measure student perceptions about their performance on the achievement test.

Analysis showed statistically significant differences between males and females on the Success-Ability and Success-Effort subscales. Males attributed success on the achievement test to ability more than did females whereas females attributed success to effort more than did males. These results follow along previously stated assumptions that successful students tend to attribute passing to ability and effort. Statistically significant differences also appeared on the Failure-Ability and Failure-Task subscales. In both of these cases, females attributed failure on the mathematics achievement test to lack of ability or difficulty of task more than did the male students. Similar to Cortés-Suárez and Sandiford (2008), only four dimensions were used in the classification (ability, effort, task difficulty, luck). Also, since this research used subjects in high school, no inference can be made to the attribution patterns of successful and unsuccessful adult students. However, this study could be applied to Traditional college students as defined by Horn and Carroll (1996).

Shea and Llabre (1985) investigated consistencies, based on gender, in causal attributions in a college-level mathematics, English, and social science courses. The researchers trial-tested and used their own instrument called the Test Attribution Questionnaire. It is a five-point choice scale containing 10 different attributions: Luck, Mood, Effort, Textbook, Task Difficulty, Instructor, Ability, Attitude Toward the Subject, Incentive to Do Well and Influence of Others. During pilot testing, the researchers observed the phenomenon in which students view failure as something different than the opposite of success, which in turn may need other attributes. Therefore, only successful students (students receiving an A or B) were analyzed in this particular study.

Of the 1,110 students who were administered the questionnaire, 108 mathematics students were deemed successful (75 women, 33 men). Among the successful mathematics students, the attribution Luck was the least important, with women more likely not to attribute success in mathematics to luck than men. The attribution Effort was the most important for success by the mathematics students. Among the other attributions, Textbook, Instructor and Influence of Others were viewed as important by the successful mathematics students. However, there was no difference by gender. There were no main effects from Mood, Task Difficulty, Ability, Attitude and Incentive among successful mathematics students. The fact that the researchers used their own instrument, which included attributions not list by Weiner (1986), needs to be noted.

Powers, Choroszy, Douglas, and Cool (1985) compared attributions between Samoan males and females in a college algebra course, and if these differed between mainland students. One hundred twenty-seven full-time Samoan students (58 men and

69 women) were administered the Mathematics Attribution Scale: Algebra Version in the spring of 1985. Statistical analysis on the means of the eight scales revealed no difference in attributions of success or failure between Samoan men and women. While this study helps contribute to the belief in no difference in attributions in males and females, the age of the study along with the population taken (Samoan college students) needs to be noted.

Lehmann (1987) identified characteristics of college freshmen taking a basic algebra course at a large Midwestern university. One of the characteristics investigated was students' attributions. Ninety-eight students were asked to complete the Adult Mathematics Attribution Scale (AMAS), which presented eight mathematical situations to the student: four academic and four secular. Two of each type is described as a situation resulting in success and as a situation resulting in failure. Students were asked to rate these situations among four scales: ability, task, effort and luck. Using scores from another part of the investigation, students were classified on a scale of -1 to 1 with -1 being "learned helplessness" and 1 being "mastery." When comparing students by gender and age, no significant differences appeared in attribution styles to the presented situations. Similar to Powers, Choroszy, Douglas and Cool (1985), the age of the study, along with the population, needs to be taken in to account. However, support is provided for no differences in attributions based on gender.

Beyer (1997) set out to determine differences by gender in causal attributions of success and failure among college students. Two hundred forty-seven students were asked to fill out 4 questionnaires – the Life Orientation Test, which measures optimism, the Locus of Causality scale, Zung's Self-Rating of Depression Scale (SDS) and the

Rosenberg Self-Esteem Scale – about a hypothetical grade (A or F) in three different classes, one of which was College Algebra. Based on gender, females selected “motivated” more often than males as a reason for an A in College Algebra whereas males checked “ability” most often. Males also rated “interest” as a more important cause for an A in College Algebra as did females. As far as reasons for receiving an F, females rated “task difficulty” as a cause more than males. Beyer concluded females tend to give credit for success to effort attributions as opposed to males, and success in College Algebra is more motivating for females than males. While Beyer did not use a scale devised from the Weiner (1986) model, the results can be expanded to fit his theory. Females tended to attribute success to hard work – an internal, unstable, controllable attribute and failure to lack of ability. Males felt success, especially in disciplines like mathematics, came more from ability and less from effort. Failures tended to be more internal for males than females also.

Nontraditional Students in Mathematics Courses

Fredrick, Mishler, and Hogan (1984) explored if there were any differences between adult freshmen students and traditional-aged students on college mathematics placement tests at the University of Wisconsin – Green Bay, and if so, on what items the student differed. For this study, adult freshmen were defined as any freshman over the age of 25 as of September 1, 1980. A total of 73 adult freshmen and 738 traditional-aged freshmen participated in the study. The scores on a college mathematics placement tests were compared between the 73 adult freshmen and a random sample of 100 traditional-aged freshmen from the larger 738 total. Results showed that adult students’ scores were significantly lower than younger freshmen. Item by item analysis revealed adult

freshmen missed more problems involving applications of mathematics and understanding mathematical concepts.

Walker and Plato (2000) examined the proficiency level of older college students on a placement test and the performance level of older students compared to younger students in three developmental mathematics courses: Fundamentals of Mathematics, Elementary Algebra and Intermediate Algebra. Older students were defined in this study as students who were 26 years of age or older at the beginning of the semester. As far as enrollment, a higher than expected number of older students (33 out of 120 students) were enrolled into Fundamentals of Mathematics, the most basic of the developmental mathematics courses, while a less than expected number of younger students (87 out of 120 students) were enrolled in the same course. The opposite effect appeared in Intermediate Algebra, the most complex developmental mathematics course: less than expected number of older students (35 out of 205) and more than expected younger students (170 out of 205) were enrolled in this course. These results indicated older students lacked the necessary knowledge to enter more complicated mathematics courses as compared to younger students.

Pass-fail frequencies of the older students were examined in all three courses. Passing was classified as completing the course with a grade of A, B or C while failing was completing the course with D or F. The pass-fail frequencies for each course were as follows: for Fundamentals of Mathematics, 27 of the 33 older students passed the course; for Elementary Algebra, 17 of the 24 older students passed the course; for Intermediate Algebra, 14 of the 35 older students passed the course. When compared to younger students, the older students' pass-fail rates were better in Fundamentals of Mathematics

and Elementary Algebra and similar to younger students in Intermediate Algebra. The authors suggest, as a reason for this phenomenon, older students tended to take more pride and have more positive attitudes towards mathematics as opposed to younger students.

Gupta, Harris, Carrier, and Caron (2006) wanted to collect information on possible predictors and course factors on determining student's grades in an introductory level mathematics course at the University of Southern Maine. Thirty classes were randomly selected among all sections of three different mathematics courses offered during 2003 to complete a questionnaire. The questionnaire collected data on student demographics (sex, age, major), factors that could impact studying (work, course load, children at home), academic background (high school math taken, remedial math taken) and learning behaviors (number missed classes, hours of math tutor attended).

Statistical analysis revealed older students and male students tended to receive higher grades when compared to younger students and female students. Ordinal logistic regression model also identified age and sex of student as two of eight independent variables that correlated significantly with course grade. Some characteristics of Nontraditional students, such as number of hours per week worked, number of children at home, number of years since last mathematics course was taken, did not correlate significantly with course grade. The authors attribute this finding to the possibility that adult, older students are more willing to learn and succeed when they re-enter college and are usually making sacrifices (work, time with children) to attend class.

Developmental Mathematics

According to the National Center for Education Statistics (2008), approximately 22% of community college students and 15% of university students have taken a remedial mathematics course. According to Stigler, Givvin, and Thompson (2010), developmental mathematics differs from school to school, but are generally offered in a sequence of basic arithmetic, pre-algebra, elementary algebra, and finally intermediate algebra. Developmental mathematics is a necessary option for today's student population. With more students re-entering college after years away from school, courses need to be available to help "fill in" the gaps one might have. By offering developmental mathematics, it has been shown it can lead to success not only in other mathematics courses, but also other mathematics-related courses. By delaying the required remediation, students are not only at risk of failing other college-level mathematics courses, but also of not completing their education plan altogether.

Head and Lindsey (1984) looked at 68 undergraduate students' grades in remedial math and ensuing performance in College Algebra at a four-year university. Their findings indicated both the students who passed remedial math and immediately enrolled in College Algebra and the students who failed College Algebra, enrolled and passed remedial math, and then re-took College Algebra did significantly better than students who failed remedial math and enrolled in College Algebra anyways. This result led to the authors' idea that remedial mathematics improves performance in college-level mathematics courses, such as College Algebra.

Johnson (1996) studied the relationship between performance in a developmental mathematics course and subsequent college-level mathematics courses. The study

consisted of 824 students over a three-year period from a community college in the southwest. After controlling for age, gender, ethnicity, number of dependents, employment, time between developmental course and college-level course, number of attempts at each course and overall satisfaction of developmental course, the overall grade in the developmental course was the strongest predictor of success in the college-level course.

As part of a larger study, Penny and White (1998) examined the relationship between success in the highest level of developmental mathematics courses and success in College Algebra at three public universities between fall 1992 and spring 1994. After examining 1,475 students total, regression analysis showed the strongest correlation was between the two dependent variables Performance in Developmental Mathematics and Performance in College Algebra, with the relationship being a positive direct effect.

Waycaster (2001) examined the effectiveness of developmental mathematics courses in preparing students for college-credit courses at five different community colleges in Virginia. After analyzing data from 1993 to 2000, Waycaster found students who had immediately enrolled in college-level mathematics courses after successful completion of developmental mathematics performed as well or better than students who were placed into these college-level mathematics courses. Retention rates among developmental mathematics students were significantly better than non-developmental students in college-level mathematics courses over a three-year period from 1997 to 2000.

Wheland, Konet, and Butler (2003) investigated student perceived beliefs about success in college-credit mathematics courses. According to the authors, one belief

commonly held by students is success in a remedial mathematics course, such as Intermediate Algebra, has no bearing on the success of the student in college-credit courses. Students enrolled in Intermediate Algebra during the fall 1999 semester were tracked to see if they immediately enrolled in another mathematics course in the spring semester, and if so, how they performed. Of the 1,161 students enrolled in the fall 1999 semester of Intermediate Algebra, 723 enrolled in another mathematics course the following semester. Statistical analysis revealed successful student performance in Intermediate Algebra had a positive impact on student successes in other mathematics courses.

Developmental mathematics has shown to have an effect on students' academic careers other than improving college-level mathematics course grades. Lesik (2006) found students who enrolled in a developmental mathematics program were significantly less likely to drop out than those who never enrolled in a developmental mathematics class. Johnson and Kuennen (2004) extended the idea that developmental mathematics improves not only college-level mathematics courses, but also college-level mathematics related courses, such as microeconomics. Analysis of 1,462 students showed students who had fulfilled their developmental mathematics requirements did significantly better than those who had delayed taking the courses prior to enrolling in microeconomics.

Conclusion

The literature concerning Nontraditional students, developmental mathematics courses and causal attributions is not available in one particular study; rather, it is presented over several different types of research and has to be piece-milled. From what literature that is available, there are several important holes which need to be considered:

1. The research spans over several decades (1980's to today) and is sporadic
2. Most of the research used populations outside of the southeast United States.
3. Of the research which distinguished between Traditional and Nontraditional students, none used a definition of Nontraditional student resembling what NCES uses. Most of the research used a broad definition based on age.

The purpose of this research is to attempt to provide evidence to fill the above gaps. This research will focus particularly on differences between Traditional and Nontraditional students' causal attributions in a developmental mathematics course. Nontraditional students will be classified according to Horn and Carroll's (1996) definition. These Nontraditional students will be divided into three groups (Minimally Nontraditional, Moderately Nontraditional, Highly Nontraditional) based on responses to a questionnaire. Also, the population used will be one from the southeast United States, an underrepresented region in previous research. By making these adjustments, all of the previously mentioned gaps will be covered.

CHAPTER III

METHODOLOGY

The purpose of this study was to determine if a relationship existed between reported exam grades and Traditional and Nontraditional students' causal attributions of their grade in a developmental mathematics course, Intermediate Algebra, at a community college. In addition, differences based on gender among Nontraditional students were examined. This chapter contains a description of the research design, participants involved, instrumentation used and data analysis conducted.

Research Design

The research design for this study was correlational using a self-report questionnaire. Students were asked to report their particular grades on a given in-class test, describe their beliefs about the reported test grade and report attributions along four dimensions: Locus of Causality, Stability and Controllability (Personal and External). Attributions of the students, based on reported exam grades, were examined for differences using statistical methods. The independent variables were student classification (Traditional, Minimally Nontraditional, Moderately Nontraditional, Highly Nontraditional) and exam grade classification (low or high) on a single test. The dependent variables were the scores of the four dimensions measured by the Revised Causal Dimension Scale.

Participants

The sample used in this study consisted of freshmen and sophomore students enrolled in a developmental mathematics course, Intermediate Algebra MAT 1233, at a southeastern community college during the Spring 2011 semester.

MAT 1233 Intermediate Algebra is a 3 credit hour course that does not fulfill any requirements for a degree. This course covers linear equations and their graphs, inequalities and number line graphs, rational expressions, factoring, exponents, radicals and polynomials. (MGCCC – Intermediate algebra syllabus). Students in this course have satisfied one of the following requirements:

1. Successfully completed MAT 1203 Beginning Algebra with a grade of D or better;
2. Have an ACT Math score between 1 and 12 and passed Algebra 1 and Algebra 2 in high school with a grade of C or better;
3. Have an ACT Math score between 13 and 21 and passed only Algebra 1 in high school with a grade of C or better;
4. Have a COMPASS Math score between 0 and 15 and passed Algebra 1 and Algebra 2 in high school with a grade of C or better; or
5. Have a COMPASS Math score between 16 and 50 and passed Algebra 1 in high school with a grade of C or better. (MGCCC – Counselor Resource Book, p. 13)

Students who do not provide ACT exam scores are required to take the COMPASS placement exam before being able to register for classes. The COMPASS exam is an untimed, multiple-choice test created by the American College Test (ACT) program. The program is designed to be “computer-adaptive” in which the difficulty of the next question depends on whether the student answered the previous question correctly. The mathematics portion covers topics in Pre-Algebra (mean, median, mode; fractions, decimals, percentages; integers, exponents, square roots, scientific notation),

Algebra (basic operations/factoring polynomials; setting up equations and substitution; linear equations with one or two variables; radicals and rational expressions), College Algebra (matrices; arithmetic and geometric sequences and series; functions and complex numbers), Geometry (angles; rectangles; triangles; circles; three-dimensional concepts; hybrid and composite shapes), and Trigonometry (special angles; trigonometric identities and functions; trigonometric equations and inequalities; right-triangle trigonometry; graphs of trigonometric functions). At the lowest level, students are tested on basic operations of numbers. At the highest level, students are asked to demonstrate a conceptual understanding of mathematical knowledge (COMPASS). Calculators are permitted on the test.

During the Spring 2011 semester, 24 sections with approximately 500 students were asked to participate in the study. As of 2009, the average student age at the college was 25.8 years (Mississippi Gulf Coast Community College, A) with 71% Caucasian, 23% African American, 3% Asian American, 2% Hispanic, and 1% other (Mississippi Gulf Coast Community College, B). Dual-enrolled high school students may have been present in the population. Any student under the age of 18 was not allowed to participate.

Instrumentation

The instrument used was a self-report questionnaire consisting of four parts: (a) a demographic data section asking for gender, age, and ethnicity; (b) seven questions with yes/no answer choices which were used to determine the students' classification as Traditional, Minimally Nontraditional, Moderately Nontraditional, or Highly Nontraditional; (c) a short answer section asking the student to report his or her exam grade, and to describe why he or she made the reported test grade; (d) the Revised Causal

Dimension Scale (CDSII). The Revised Causal Dimension Scale (CDSII) contains 12 items, each with a semantic differential scale of 9 to 1. Each of the three items from the CDSII relate to Locus of Causality, Stability, Personal Controllability and External Controllability. The controllability dimension has been separated into Personal Controllability and External Controllability by the authors of the CDSII due to internal inconsistency on the controllability dimension in the Causal Attribution Scale (McAuley, Duncan, & Russell, 1992). Written permission was given by Daniel Russell to use the CDSII in this study.

Procedure

Data were collected by instructors of Intermediate Algebra at a southern Mississippi community college in the Spring 2011 semester. The instructors were provided with copies of the questionnaire and instructions on when and how to administer it. Students were informed participation was completely voluntary and no action, positive or negative, would result if they chose to or not to participate. Students were instructed that by participating they were giving informed consent. The questionnaire should have taken no longer than fifteen minutes to complete and was administered at the end of the class meeting in which the students received their test grades for a major test. There was no foreseeable risk to students who wished to participate. All students' records were kept confidential, and no names were collected. Once the data was entered and presented, all questionnaires were destroyed.

Data Analysis

Data from the self-report questionnaire was compiled and coded from all participating students. Descriptive statistics were calculated on student demographics,

reported attributions and responses to the CDSII. Open-ended questions concerning casual attributions were coded according to the classification scheme of Weiner (1986) and frequency distributions were tabulated. Pearson chi-square test for relationships in causal attributions were performed between low-graded Traditional and Nontraditional students (Minimally, Moderately, Highly), as well as between high-graded Traditional and Nontraditional students (Minimally, Moderately, Highly).

Statistical analysis of the four subscale scores on the CDSII was conducted on low-graded students and high-graded students using Multivariate Analysis of Variance (MANOVA) with a p-value of < 0.05 . The independent variable was student classification (Traditional, Minimally Nontraditional, Moderately Nontraditional, Highly Nontraditional). Four dependent scaled variables were considered as measured by the CDSII: Locus of Causality = average of questions 1, 6, and 9; Stability = average of questions 3, 7, and 11; Personal Controllability = average of questions 2, 4 and 10; and External Controllability = average of questions 5, 8, and 12.

A second analysis was conducted using only Nontraditional (Minimally, Moderately, Highly) students to see if a relation existed in causal attribution scores based on gender. The Pearson chi-square test was used to test for relationships based on gender on the frequency distributions of low-graded and high-graded Nontraditional students.

CHAPTER IV

RESULTS

The purpose of this study was to determine if a relationship existed between exam grades and students' causal attributions of their grade in a developmental mathematics course, Intermediate Algebra, at a community college. This study also looked at the differences in causal attributions of grades between Traditional and Nontraditional students. In addition, among Nontraditional students, differences based on gender were examined. This study involved the independent variables of student classification (Traditional, Minimally Nontraditional, Moderately Nontraditional and Highly Nontraditional) and exam grade classification (low and high) on a single test. The dependent variables were students' causal attribution scores along four dimensions, which were measured by the Revised Causal Dimension Scale (McAuley, Duncan, & Russell, 1992). A second analysis was done with only Nontraditional students using gender as the independent variable and students' causal attribution scores along four dimensions measured by the Revised Causal Dimension Scale as the dependent variables.

The goal of this research was to determine if causal attributions differed between Traditional and Nontraditional students based on exam grade. In addition, Nontraditional students' causal attributions to different levels of exam grades were examined for differences based on gender. This chapter discusses the results of the quantitative analysis on the four dimensions of causal attributions between each classification level of student and exam grade. Descriptive and inferential statistics are reported with conclusions on each research hypotheses.

Descriptive Statistics

Sample

The sample for this study consisted of 24 sections of Intermediate Algebra containing a total of 488 students at the beginning of the Spring 2011 semester. Each instructor was given copies to distribute of the self-report questionnaire, which contained the Revised Causal Dimension Scale (CDSII) in the Spring 2011 semester. The instructors were allowed to distribute the questionnaires at their convenience but were encouraged to do so as early as possible. Due to non-uniformity in tests, each section's students completed the questionnaire about different topics covered in Intermediate Algebra. A total of 331 completed questionnaires were returned from these 24 sections for a response rate of 68% by May of the Spring 2011 semester.

Descriptive Analysis of Data

The first three parts to the self-report questionnaire contained questions regarding student demographics. Of the 331 returned questionnaires, 58% were female, 35.6% were male and 6.3% did not respond. Ethnicity distribution was as follows: 62.8% Caucasian; 21.5% African-American; 4.2% Hispanic; 2.1% Asian-American; 2.1% other; and 7.3%, No Response.

Using the definition provided by Horn and Carroll (1996), the next seven questions classified the students in the sample as Traditional, Minimally Nontraditional, Moderately Nontraditional or Highly Nontraditional. On Questions 2 through 7, the student would receive a score of 0 if he or she answered "No" and a score of 1 if he or she answered "Yes." Question 1 was reverse-scored with "Yes" being scored 0 and "No"

being scored 1. Table 4 shows students' classifications according to their scores and the frequency of each classification of students.

Table 4

Student Classification and Frequency

Student Classification	Score	Frequency
Traditional	0	16.3%
Minimally Nontraditional	1	19.0%
Moderately Nontraditional	2 – 3	40.5%
Highly Nontraditional	4 – 7	23.9%
No Response		0.3%

Question 8 on the self-report questionnaire asked the students to report their grade on the returned exam. All reported exam grades were converted to a percentage grade. The mean of all exam grades was 74.1% with a standard deviation of 23.3%. The range of grades was from 0% to 110%. Some exam grades reported were allowed extra credit. Exam grades were classified into two groups based on the distribution of data: Low – exam grades 69% or below, and High – exam grades 80% or above. Using these criteria, the exam grade distribution was as follows: 29% Low, 50.2% High, 14.5% Other and 6.3% No Response.

The next portion of the questionnaire asked students to identify the main reason they felt they made the reported exam grade. These reasons were coded according to Weiner's (1986) attribution theory into one of eight categories. Table 5 shows the frequencies of each category based on student classification and exam grade rank.

Table 5

Frequency of causal attributions based on student classification and exam grade rank

	Traditional		Minimally Nontraditional		Moderately Nontraditional		Highly Nontraditional	
	Low Grade	High Grade	Low Grade	High Grade	Low Grade	High Grade	Low Grade	High Grade
I-S-C	5	16	6	6	12	28	3	19
I-S-UnC	6	1	3	3	10	7	4	6
I-UnS-C	2	4	5	6	5	22	3	11
I-UnS-UnC	3	0	2	1	4	0	2	0
E-S-C	1	0	0	1	3	7	0	5
E-S-UnC	1	1	2	2	0	3	0	0
E-UnS-C	0	0	0	3	1	0	0	2
E-UnS-UnC	1	0	2	0	3	2	3	2

Note. I=Internal, S=Stable, C=Controllable, E=External, UnS=Unstable, UnC=Uncontrollable

The Revised Causal Dimension Scale (CDSII) consists of 12 questions measuring four dimensions: Locus of Causality – mean of Questions 1, 6, 9; Stability – mean of Questions 3, 7, 11; Personal Controllability – mean of Questions 2, 4, 10; External Controllability – mean of Questions 5, 8, 12. Each question had a possible integer response of 1 to 9. Reliability analysis revealed Cronbach's alpha coefficients of 0.748, 0.648, 0.884, and 0.735, respectively. The Cronbach's alpha for the Stability dimension was lower than the 0.7 criteria. Table 7 illustrates the mean scores for all four causal dimensions, based on classification, of low-graded and high-graded students.

Table 6

Mean scores of causal dimensions of low-graded and high-graded students based on classification

	Locus of Causality		Stability		Personal Controllability		External Controllability	
	Low Grade	High Grade	Low Grade	High Grade	Low Grade	High Grade	Low Grade	High Grade
Traditional	6.26	6.69	4.21	6.08	6.19	6.91	4.04	4.39
Minimally Nontraditional	6.15	6.93	4.22	6.00	7.32	6.96	4.00	5.25
Moderately Nontraditional	5.72	7.15	4.08	5.61	5.32	7.78	3.85	3.42
Highly Nontraditional	6.71	7.21	4.20	6.10	6.89	7.84	4.38	3.38

In all subsets of students, the Locus of Causality and Stability means were greater in the high-graded students than in the low-graded students. This indicates students who graded high tended to attribute their successes more towards the internal and stable direction. The Personal Controllability means were greater in the high-graded students than in low-graded students for all groups but Minimally Nontraditional students. For External Controllability, both Traditional and Minimally Nontraditional students' attribution scores were higher in the high-graded students as compared to low-graded students. The opposite phenomenon appeared in Moderately Nontraditional and Highly Nontraditional students.

Inferential Statistics

The purpose of this research was to determine if a relationship existed between exam grades and students' causal attributions of their grades in a developmental mathematics course. The research investigated differences in causal attributions of grades between Traditional and Nontraditional students and among Nontraditional students if differences based on gender existed. There were two independent variables – student classification (Traditional, Minimally Nontraditional, Moderately Nontraditional and Highly Nontraditional) and exam grade classification (low and high) on a single test. The dependent variables were student's causal attribution scores for each of the four dimensions of Locus of Causality, Stability, Personal Controllability and External Controllability, measured by the Revised Causal Dimension Scale (McAuley, Duncan, & Russell, 1992). A second analysis was conducted with only Minimally Nontraditional, Moderately Nontraditional, and Highly Nontraditional students using gender as the independent variable and students' causal attributions as the dependent variable.

Testing of Hypotheses

The first hypothesis was tested using the Pearson chi-square test and the last four hypotheses were tested using Multivariate Analysis of Variance (MANOVA).

H₁: There will be a statistical relationship between low-graded and high-graded students' causal attributions to exam grades.

A Pearson chi-square test was performed to examine the relation between attribution statements of low-graded and high-graded students. Table 7 summarizes the results. Of the 64 cells used, 46 had expected values less than 5, which violate an assumption of a chi-square test.

Table 7

Pearson chi-square results for relationships between low-graded and high-graded students' attribution statements based on student classification

Student Classification	df	N	χ^2	p-value
All	7	262	37.77	<0.01*
Traditional	6	45	14.86	0.021*
Minimally Nontraditional	7	43	6.34	0.50
Moderately Nontraditional	7	111	20.14	0.005*
Highly Nontraditional	6	63	14.41	0.025*

*Statistically significant using p – value < 0.05

Overall, the relation between low-graded and high-graded students was significant, $\chi^2(7, 283) = 37.77, p < 0.01$. Referring to Table 6, low-graded students attributed their scores to a more diverse set of attributes while high-graded students tended to attribute their scores towards the internal, stable and controllable directions. For Traditional, Moderately Nontraditional and Highly Nontraditional students, the relation between attribution statements of low-graded and high-graded students followed the same pattern as the group as a whole; low-graded attributes were spread out over the eight categories while high-graded students chose internal, stable and controllable aspects more frequently. However, for Minimally Nontraditional students, the Pearson chi-square test reported no relation between attribution statements of low-graded and high-graded students, $\chi^2(7, 42) = 6.34, p = .50$. Table 5 reveals that the frequency of the attributes did not differ based on exam grade in this group of students.

H₂: There will be no statistical difference in causal attribution scores between Traditional and Nontraditional (Minimally, Moderately, Highly) students who report a low grade on a developmental mathematics test.

Using only low-graded students, MANOVA was conducted with the independent variable being student classification (Traditional, Minimally Nontraditional, Moderately Nontraditional, Highly Nontraditional) and the dependent variables being scores on the four dimensions of the CDSII. The equality of covariance matrices across all groups was tested with Box's test statistic, which was $p = 0.083$. Since this result was non-significant, this assumption was met. Using Pillai's trace, there was a significant relation between student classification and scores on the CDSII, $V = .263, F(12, 267) = 2.138, p = 0.015$. Table 8 shows the results from the MANOVA on the four dimensions for low-graded students.

Table 8

MANOVA results for CDSII scores of low-graded students based on student classification

	df	df error	F	p-value
Locus of Causality	3	90	1.326	0.271
Stability	3	90	0.049	0.986
Personal Controllability	3	90	5.380	0.002*
External Controllability	3	90	0.290	0.832

*Statistically significant using p-value < 0.05

For low-graded students, the dimension of Personal Controllability was statistically significant. Table 6 suggests Traditional ($M = 6.19$), Minimally Nontraditional ($M = 7.32$), and Highly Nontraditional ($M = 6.89$) students tended to attribute their low grades to aspects in which they felt they could personally control, while the Moderately Nontraditional ($M = 5.32$) students overall felt the low grades leaned more towards the personally uncontrollable direction when compared to all other students.

The MANOVA was followed up with a discriminant analysis revealing three discriminant functions. The first function generated significantly differentiated low-graded students based on classification, $\Lambda = 0.75, \chi^2(12) = 25.97, p = 0.011$, with a canonical correlation $R^2 = 0.22$. Table 10 shows the standardized function coefficients and correlation coefficients for this function.

Table 9

Correlation coefficients and standardized function coefficients for low-graded students

	Correlation Coefficients with Discriminant Functions	Standardized Function Coefficients
Locus of Causality	0.262	0.706
Stability	0.066	0.265
Personal Controllability	0.794	1.437
External Controllability	0.103	0.250

The function was named Low-Scoring Students' Personal Controllability since this variable was most associated with the function. Figure 2 shows that this function discriminated Minimally Nontraditional students from all other students.

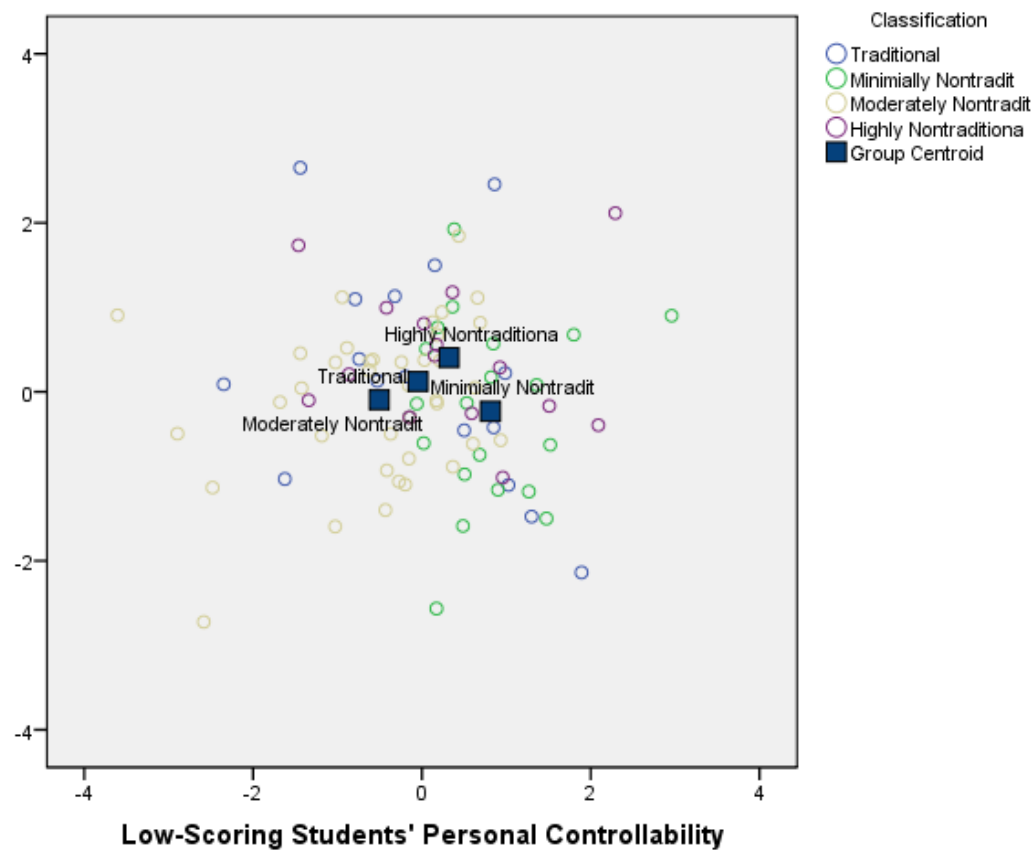


Figure 2. Low-Scoring Students' Personal Controllability Discriminant Function

H₃: There will be no statistical difference in causal attribution scores between Traditional and Nontraditional (Minimally, Moderately, Highly) students who report a high grade on a developmental mathematics exam.

Using only high-graded students, MANOVA was used with the independent variable of student classification (Traditional, Minimally Nontraditional, Moderately Nontraditional, Highly Nontraditional) and the dependent variables of scores on the four dimensions of the CDSII. The equality of covariance matrices across all groups was tested with Box's test statistic, which was $p = 0.004$. Since this result was significant, this assumption was not met. According to Field (2009), this result may have occurred due to the fact there was unequal sample sizes in the classifications of students (Traditional = 25; Minimally

Nontraditional = 20; Moderately Nontraditional = 68; Highly Nontraditional = 46).

Using Pillai's trace, there was a significant relation between student classification and scores on the CDSII, $V = 0.169$, $F(12, 462) = 2.300$, $p = 0.008$. Table 10 shows the results from the MANOVA on the four dimensions for high-graded students.

Table 10

MANOVA results for CDSII scores of high-graded students based on student classification

	df	df error	F	p-value
Locus of Causality	3	155	0.729	0.536
Stability	3	155	0.778	0.508
Personal Controllability	3	155	3.804	0.011*
External Controllability	3	155	5.577	<0.01*

*Statistically significant using p-value < 0.05

For high-graded students, there was a statistically significant difference in the dependent variables of Personal Controllability and External Controllability scores. For Personal Controllability, the Traditional ($M = 6.91$) and Minimally Nontraditional ($M = 6.96$) students did not attribute their high scores to attributes they felt could be personally controlled as compared to Moderately Nontraditional ($M = 7.78$) and Highly Nontraditional ($M = 7.84$). The reverse occurred in the External Controllability dimension. Both Traditional ($M = 4.39$) and Minimally Nontraditional ($M = 5.25$) students attributed their high scores more towards the externally controllable direction as

compared to Moderately Nontraditional ($M = 3.42$) and Highly Nontraditional ($M = 3.38$) students. This occurrence could possibly be explained by the notion Personal Controllability and External Controllability may represent the opposite poles of a single dimension. However, the model of using four factors has been shown to provide a better fit of data than a combination in which these two dimensions are collapsed into one (McAuley, Duncan, & Russell, 1992).

The MANOVA was followed up with a discriminant analysis revealing three discriminant functions. The first function generated significantly differentiated high-graded students based on classification, $\Lambda = 0.84$, $\chi^2(12) = 27.65$, $p = 0.006$, with a canonical correlation $R^2 = 0.14$. Table 11 shows the standardized function coefficients and correlation coefficients for this function.

Table 11

Correlation coefficients and standardized function coefficients for high-graded students

	Correlation Coefficients with Discriminant Functions	Standardized Function Coefficients
Locus of Causality	-0.249	-0.537
Stability	0.130	0.080
Personal Controllability	-0.661	-0.868
External Controllability	0.823	0.668

The function was named Controllability of High-Scoring Students since the variables Personal Controllability and External Controllability were most associated with the function. Figure 3 shows that this function discriminated Traditional and Minimally

Nontraditional students from Moderately Nontraditional and Highly Nontraditional students.

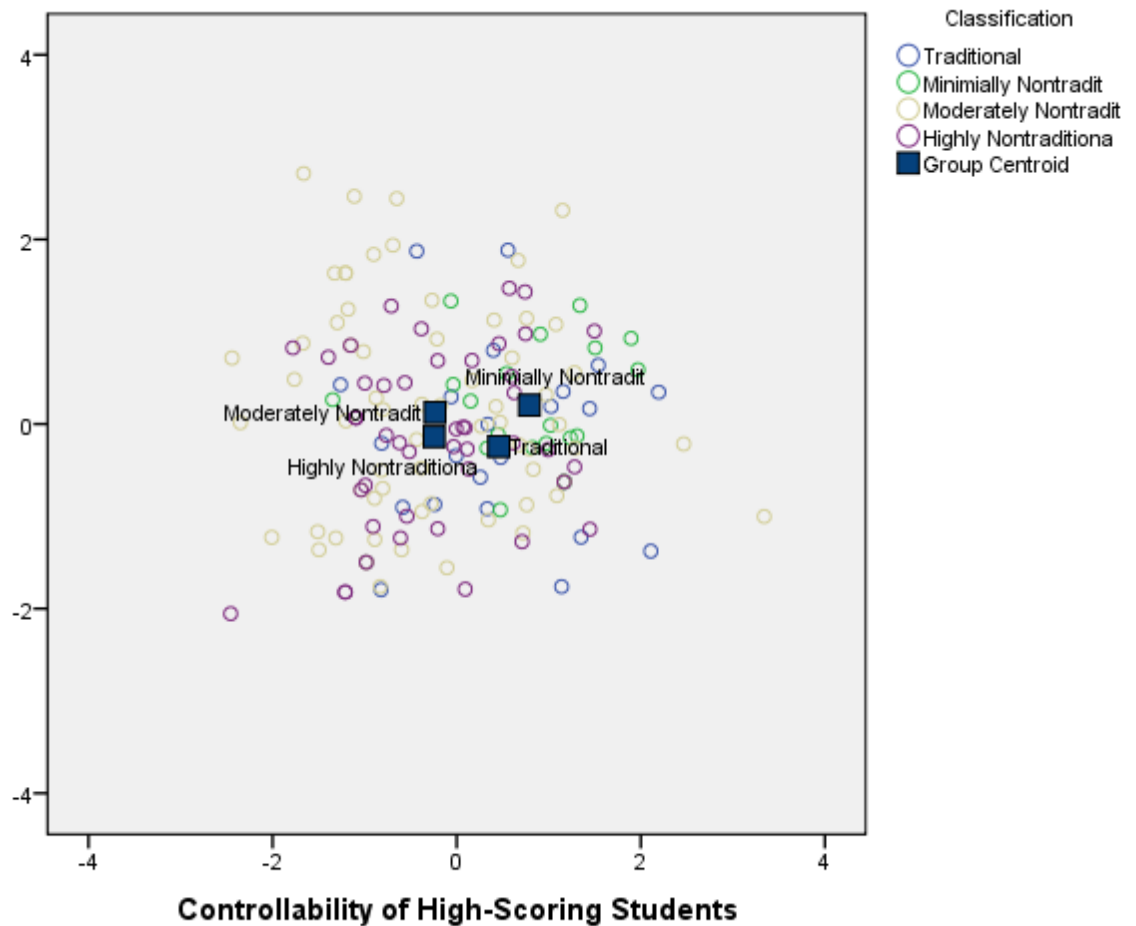


Figure 3. Controllability of High-Scoring Students Discriminant Function

H₄: There will be no statistical difference based on gender in causal attribution scores among Nontraditional (Minimally, Moderately, Highly) students who score low on a developmental mathematics test.

Table 12 shows the mean attribution scores of low-graded Nontraditional students based on gender.

Table 12

Mean attribution scores for low-graded, Nontraditional students based on gender

	Male	Female
Locus of Causality	5.48	6.40
Stability	3.98	4.34
Personal Controllability	5.87	6.34
External Controllability	4.47	3.78

Using only low-graded, Nontraditional students, MANOVA was conducted with the independent variable being gender and the dependent variables being scores on the four dimensions of the CDSII. The equality of covariance matrices across the two groups was tested with Box's test statistic, which was $p = 0.354$. Since the result was non-significant, this assumption was met. Using Pillai's trace, there was a significant relation between gender and scores on the CDSII, $V = .148, F(4, 66) = 2.863, p = 0.03$. Table 13 shows the results from the MANOVA on the four dimensions for low-graded, Nontraditional students based on gender.

Table 13

MANOVA results for CDSII scores of low-graded, Nontraditional students based on gender

	df	df error	F	p-value
Locus of Causality	1	69	5.258	0.025*
Stability	1	69	0.716	0.400
Personal Controllability	1	69	0.824	0.362
External Controllability	1	69	2.470	0.121

* Statistically significant using p-value < 0.05

Based on gender, the Locus of Causality dimension was statistically significant for Nontraditional students. Low-graded, Nontraditional females ($M = 6.40$) tended to attribute the exam result more towards Internal attributes while low-graded, Nontraditional males leaned more towards External attributes ($M = 5.48$).

The MANOVA was followed up with a discriminant analysis revealing one discriminant function. This function significantly differentiated low-graded, Nontraditional students by gender, $\Lambda = 0.85$, $\chi^2(4) = 10.72$, $p = 0.03$, with a canonical correlation $R^2 = 0.15$. Table 14 shows the standardized function coefficients and correlation coefficients for this function. The function was named External Controllability since this variable was most associated with the function.

Table 14

Correlation coefficients and standardized function coefficients for low-graded, Nontraditional students based on gender

	Correlation Coefficients with Discriminant Functions	Standardized Function Coefficients
Locus of Causality	0.663	0.661
Stability	0.244	0.776
Personal Controllability	-0.265	-0.102
External Controllability	-0.454	-0.879

H₅: There will be no statistical difference based on gender in causal attribution scores among Nontraditional (Minimally, Moderately, Highly) students who report a high grade on a developmental mathematics exam.

Table 15 shows the mean attribution scores of high-graded Nontraditional students based on gender.

Table 15

Mean attribution scores for high-graded, Nontraditional students based on gender

	Male	Female
Locus of Causality	6.80	7.27
Stability	5.45	6.00
Personal Controllability	7.77	7.64
External Controllability	3.63	3.64

Using only high-graded, Nontraditional students, MANOVA was conducted with the independent variable being gender and the dependent variables being scores on the four dimensions of the CDSII. The equality of covariance matrices across the two groups

was tested with Box's test statistic, which was $p = 0.00$. Since this result was significant, this assumption was not met. Field (2009) claims this could be due to unequal sample sizes (Females = 90; Males = 37). Using Pillai's trace, there was not a significant relation between gender and scores on the CDSII, $V = .062, F(4,122) = 2.004, p = 0.10$. This result supports the hypothesis that Nontraditional males and females who score high on an exam attribute their scores along the same attributes.

Summary

The statistical analysis indicated a relationship in reported attributions of low-graded and high-graded students. The most common reported attribute for high-graded students was Internal-Stable-Controllable, with Internal-Unstable-Controllable being the second-most frequent. Low-graded students reported attributes were more spread across the eight possible categories. When separated by student classification, this overall trend appeared in Traditional, Moderately Nontraditional, and Highly Nontraditional students. For Minimally Nontraditional students, reported attributes were more scattered over the eight categories for both low-graded and high-graded students.

On the Revised Causal Dimension Scale (CDSII), neither low-graded students nor high-graded students showed significant differences in locus of causality or stability dimensions when distinguished by student classification. For low-graded students, there was a significant difference in the Personal Controllability dimension, with Traditional, Minimally Nontraditional and Highly Nontraditional students leaning more towards personally controllable attributes, as compared to Moderately Nontraditional students, for their exam score. For high-graded students, a significant difference appeared in the Personal Controllability dimension and the External Controllability dimension. Both

Moderately Nontraditional and Highly Nontraditional students expressed their grade more towards the personally controllable direction while Traditional and Minimally Nontraditional students leaned more towards externally controllable aspects for their exam score.

When compared by gender, low-graded Nontraditional students differed on the CDSII in the Locus of Causality dimension, with females attributing their score more towards internal traits as compared to males. Among high-graded Nontraditional students, there was no significant difference in any of the dimensions.

CHAPTER V

DISCUSSION

The purpose of this study was to determine if a relationship existed between exam grades and students' causal attributions of their grades in a developmental mathematics course, Intermediate Algebra, at a community college. This study also looked at the differences in causal attributions of grades between Traditional and Nontraditional students. In addition, among Nontraditional students, differences based on gender were examined. This chapter provides a summary of the study, discussion of the findings and recommendations for future research.

Summary

The goal of this research was to examine if differences existed, based on student classification, in attributions to an exam grade in a developmental mathematics course at a two-year college. Also investigated was if differences existed in attributions of Nontraditional students based on gender. Attribution theory has been used to look for differences in passing and failing students in mathematics before, but seldom in the collegiate setting and with such a diverse population of students a community college can provide.

Sample

The sample for this study consisted of 24 sections of Intermediate Algebra containing at total of 488 students at the beginning of the Spring 2011 semester. A total of 331 completed questionnaires were returned from these 24 sections by May of the Spring 2011 semester.

Procedure

Each instructor of the 24 sections was given copies of the instrument to be distributed at his or her earliest convenience. The instrument used was a self-report questionnaire consisting of four parts: (a) a demographic data section asking for gender, age, and ethnicity; (b) seven questions used to determine the student's classification as Traditional, Minimally Nontraditional, Moderately Nontraditional, or Highly Nontraditional; (c) a short answer section asking the student to report his or her exam score, and to describe why he or she made the reported test grade; and (d) the Revised Causal Dimension Scale (CDSII). The Revised Causal Dimension Scale (CDSII) contains 12 items, each with a semantic differential scale of 9 to 1. Three items from the CDSII each relate to Locus of Causality, Stability, Personal Controllability, and External Controllability. The instructors were encouraged to distribute the instruments as soon as the next available exam grade was returned to their students. Due to non-uniformity in tests, each section's students completed the instrument about different topics covered in Intermediate Algebra. All instruments were returned to the researcher by May 2011.

Results

Descriptive analysis of the reported attributions to the exam score suggested differences in low-graded and high-graded students. Overall, high-graded students attributed their successes to internal and controllable attributes. These students credited themselves for their high grades, and felt they could control the reason or reasons for their high grades. Low-graded students' attributes were diverse and distributed over the eight possible categories. There appeared to be no consistency in the attribution pattern of low-graded students.

Statistical analysis of the descriptive data supported the descriptive analysis. The Pearson chi-square test for relationships was conducted between the reported attributions of low-graded and high-graded students. Overall, there was a statistical difference in reported attributions between low-graded and high-graded students. Thus, these results supported H_1 .

Attribution scores on the Revised Causal Dimension Scale (CDSII) of low-graded students were tested using MANOVA on the four dimensions of Locus of Causality, Stability, Personal Controllability and External Controllability. Results indicated a statistically significant difference in the Personal Controllability dimension. Students classified as Moderately Nontraditional did not attribute their low scores towards the personally controllable direction as much as Traditional, Minimally Nontraditional or Highly Nontraditional students did. Thus, H_2 was not supported.

Attribution scores on the Revised Causal Dimension Scale (CDSII) of high-graded students were also tested using MANOVA on the four dimensions of Locus of Causality, Stability, Personal Controllability and External Controllability. Results indicated a statistically significant difference in the Personal Controllability and External Controllability dimension. Students classified as Moderately Nontraditional and Highly Nontraditional attributed their high scores towards personally controllable attributes more than Traditional or Minimally Nontraditional students did. For the External Controllability dimension, Traditional and Minimally Nontraditional students attributed their scores more towards the externally controllable direction than did Moderately Nontraditional and Highly Nontraditional students. Thus, H_3 was not supported.

Differences, based on gender, in attribution scores on the CDSII were examined among all low-graded and high-graded Nontraditional students using MANOVA. Among low-graded students, there was a statistically significant difference in the Locus of Causality dimension with females attributing their low score more in the internal direction than did males. Thus, H_4 was not supported. In high-graded students, there was no statistically significant difference in attribution scores based on gender. Thus, H_5 was supported.

Discussion of Major Findings

Reported Attributions of Low-graded and High-graded Students

Research has demonstrated attributions differ between low-graded students and high-graded students (Weiner et al., 1971; Weiner, 1972; Wolleat, Pedro, Becker, & Fennema, 1980; Weiner, 1986; Cortés-Suárez & Sandiford, 2008). This current research contributes and expands on previous findings regarding how high-graded students attribute success, and how low-graded students attribute failure. Statistical analysis revealed a significant difference in reported attributions similar to Cortés-Suárez & Sandiford (2008) of low-graded and high-graded students.

With regards to high-graded students, the results of the current study were comparable to results in Cortés-Suárez & Sandiford (2008) in that high-graded students attributed success towards internal attributes. The most common internal attribute among high-graded students in this study was a mention of study habits. Other internal attributes listed by high-graded students included references to overall mathematics aptitude, good test preparation, effort and paying attention in class. For the Stability dimension, there appears to be no difference in reported attributions. High-graded students listed stable

attributes with about the same frequency as unstable attributes. This could have occurred due to different beliefs about personal mathematics ability. Previous research (Weiner & Kukla, 1970; Kukla, 1972) has shown students who believe they are strong in mathematics can attribute high scores to ability – a stable factor. Students not as confident in mathematics will attribute high scores to effort – an unstable factor. For the Controllability dimension, high-graded students overwhelmingly listed controllable attributes for their success.

On the other hand, low-graded students' attributions were not as similar to Cortés-Suárez & Sandiford's (2008) findings. In this study, there was not an apparent pattern or common attribution among low-graded students. Overall, low-graded students listed internal attributes to their failure more than external attributes. The listed internal attributes were often the opposite of the internal attributes of high-graded students; e.g. poor study habits, poor test preparation, lack of effort, did not pay attention. However, external attributes were reported with more frequency in the low-graded students than in the high-graded students. For the Stability dimension, there appeared to be an equal dispersion of stable and unstable attributes among low-graded students, except for the Moderately Nontraditional students. Low-graded students in this group reported more stable attributes for their failures far more than unstable attributes. The frequency of controllable and uncontrollable attributes among low-graded students appeared to be widely dispersed. These findings indicated the low-graded population attributed their scores to a variety of different reasons which could have resulted from a mixture of low-ability and high-ability students. Another explanation may have been the existence of

attributional egotism – the tendency to take credit for success and deny blame for failure (Dickens, 1984).

Attribution Score Differences of Low-graded and High-graded students

Statistical analysis of scores on the Revised Causal Dimension Scale (CDSII) indicated no significant differences in the Locus of Causality dimension or the Stability dimension based on student classification for either low-graded or high-graded students. For both low-graded and high-graded students, statistical analysis of the Personal Controllability dimension indicated significant differences based on student classification. For the External Controllability dimension, there was no significant difference among all low-graded students' scores. However, for high-graded students, statistical analysis of the External Controllability dimension revealed significant differences based on student classification.

Among low-graded students, the Traditional, Minimally Nontraditional, and Highly Nontraditional students scored the CDSII in the direction of personally controllable aspects. Moderately Nontraditional students scored more towards personally uncontrollable aspects. This could indicate this subset of students had more of a sense of learned helplessness than the remaining low-graded students.

While a statistically significant difference between student classifications did occur among high-graded students in Personal Controllability and External Controllability scores, it was not considered a meaningful difference. Table 6 shows that all high-graded students attributed their scores towards personally controllable aspects, and all but the Minimally Nontraditional high-graded students leaned towards externally uncontrollable aspects. The differences came in how strongly they felt about these

aspects. Both Moderately Nontraditional and Highly Nontraditional students felt their high grades came from a more personally controllable aspect and from more of an externally uncontrollable aspect as did the Traditional and Minimally Nontraditional students.

Attribution differences of Nontraditional students by gender

Statistical analysis of scores on the Revised Causal Dimension Scale (CDSII) indicated no significant differences between low-graded, Nontraditional males and females in Stability, Personal Controllability, or External Controllability dimensions. Overall, the low-graded Nontraditional males and females attributed their scores towards unstable, personally controllable, and externally uncontrollable directions. In the Locus of Causality dimension, there was a significant difference in low-graded, Nontraditional students based on gender. Low-graded, Nontraditional females attributed their grades to internal attributes more so than did males. This result is consistent with previous findings, which state females are more likely to blame internal attributes for failure, such as lack of ability, than are males (Wollett, Pedro, Becker, and Fennema, 1980; Grollino & Velayo, 1996). Analysis of scores on the CDSII indicated no significant difference in any of the four dimensions of Locus of Causality, Stability, Personal Controllability, and External Controllability among high-graded, Nontraditional students. This result is consistent with previous research (Shea and Llabre, 1985; Powers, Choroszy, Douglas, and Cool, 1985; Lehman, 1987). Similar to these previous studies, high-graded, Nontraditional students in this study attributed their exam grades towards internal, stable, personally controllable, and externally uncontrollable characteristics.

Limitations

Participants in this study were limited to those students enrolled in 24 sections of Intermediate Algebra at a community college in southern Mississippi. The participants were not randomly selected. The study was limited to the spring semester of 2011. Of these sections during this time frame, only 331 questionnaires were returned, which may not be enough responses to accurately examine the relationship between student classification and causal attributions based on exam grade. There was no uniformity in curriculum, grading scales, or in examinations in which the questionnaires were administered after. Another limitation of this study was in the coding of reported attributions. Only the researcher coded responses according to Weiner's (1986) model.

Recommendations

It is important to continue research in the causal attributions of successful and unsuccessful students, especially in high-risk courses such as mathematics. More research is needed using all three dimensions described by Weiner (1986) to identify how successful and unsuccessful students attribute results. Also, research into differences in causal attributions based on gender, race, socio-economic status, and mathematics self-efficacy need to be explored.

The researcher suggests the following implementation at the institution where the research was conducted. Since the results showed a significant difference between reported attributions of low-graded and high-graded students, it is recommended students be encouraged to implement the strategies used by high-graded students. The most common reported attribution of high-graded students was overall study habits. Students who feel they are low-ability mathematics students or feel they have anxiety about the

mathematics course can be assisted by the following means: (a) being distributed a list of successful practices in succeeding in mathematics; (b) anonymous recommendations to successes of previous students who scored high in the class; (c) be encouraged to enroll in LLS 1413 Improvement of Study, a course designed to aid in study skills, note-taking and test preparation (Mississippi Gulf Coast Community College, 2011).

Instructor intervention, as early as possible, with low-graded students is also recommended to try and improve future grades. Overall, low-graded students attributed internal, unstable and controllable scores on the CDSII for their low exam grades. This is encouraging to note because it indicates low-graded students feel improving their grades is within their control, and future performance is not dependent on previous results. Kloosterman (1984) says instructors can emphasize to students that it is within their power to change their performances (internal, controllable), especially in Nontraditional males, and that future performances can improve (unstable). This is a form of “attributional retraining.” For low-graded, Nontraditional females, Frances & Kloosterman (1995) suggest self-confidence is the key to success for these students. Boekaerts, Otten, and Voeten (2003) recommend presenting mathematical tasks as “manageable,” so self-confidence is high and effort is maximized.

For high-graded students, positive reinforcement for successes can be given by the instructors, specifically crediting the student’s internal and stable factors, such as ability (Perry & Magnusson, 1989). For the Traditional and Minimally Nontraditional students, instructors can take mind these students tended not to credit their grades to controllable aspects as much as the other students. This idea could be highlighted in

positive reinforcement, reiterating to these students their successes were within their control.

Continued research could be conducted with a larger sample size over several different geographic areas. The time frame could be expanded and track students over several semesters as they work through their developmental mathematics requirements to see if attributions change over time and course. Interviews with low-graded and high-graded students from all classifications would be beneficial in helping to identify differences in attributions. Examination of attributional intervention in a developmental mathematics course would also be helpful in determining the effect of changed or unchanged attributions. This type of study would be advantageous in deciding if attributions can be changed, if one particular subset of student is more susceptible to change than another, and if people with changed attributions do better as the semester continues.

Research into predicting success or failure using causal attributions, along with other factors, such as academic history, mathematics self-efficacy, demographic data and socio-economic status, could be conducted in order to help understand how much each contributes to success in mathematics. Each college mathematics course, developmental and non-developmental, could be explored to see if differences exist. This could help identify areas of emphasis and provide valuable indicators for instructors as to which students are more likely to succeed in their courses.

APPENDIX A

PERMISSION FROM COLLEGE ADMINISTRATOR



We make a positive difference in people's lives every day.

Willis H. Lott, President

To: Mr. Jacob Dasinger
Instructor, George County Center

From: Dr. Joan Haynes *Joan Haynes*
Vice-President for Instruction and Student Services

CC: Dr. Mary S. Graham
Dr. Dean Belton

Date: February, 24, 2011

Subject: Student Survey for Doctoral Dissertation

On January 28, 2011, the Executive Council of Mississippi Gulf Coast Community College (MGCCC) approved your request to conduct a student survey in support of your doctoral dissertation work at the University of Southern Mississippi (USM). This approval is contingent upon you receiving final approval from your dissertation committee and IRB approval from USM. The purpose of your research is to gain a better perspective on causal attributions of non-traditional students in a developmental mathematics course using a subset of MGCCC students as your population.

At present, your request consists of a survey of students in all sections of Intermediate Algebra during the Spring 2011 semester (approximately 600 students) in a paper/pencil format. The survey currently consists of 22 questions and will be administered by the course instructors after the instructor has graded and returned the results of any test in the course. You will need to coordinate with the Deans of Instruction on each campus and the Administrative Deans at the centers when you are ready to implement and deliver your surveys.

Good luck in your research efforts!

Supported by Harrison, Stone, Jackson and George Counties • www.mgccc.edu

Community Campus/
Advanced Manufacturing
and Technology Center
10298 Express Drive
Gulfport, MS 39505
228-897-4360

Jackson County Campus
Highway 90 Vancleave Rd.
P.O. Box 100
Gautier, MS 39553
228-497-9602

Jefferson Davis Campus
2226 Switzer Rd.
Gulfport, MS 39507-3896
228-896-3355

Keesler Center
P.O. Box 5008
Keesler AFB, MS 39534
228-432-7198

West Harrison
County Center
21500 B Street
Long Beach, MS 39560
228-865-6057

Perkinston Campus
Highway 49 South
P.O. Box 548
Perkinston, MS 39573
601-928-5211

George County Center
P.O. Box 71
Lucedale, MS 39452
601-947-4201

APPENDIX B

INSTRUCTOR PROTOCOL



INSTRUCTOR PROTOCOL

Instructors: On the same day as you release/give back a major exam grade, please distribute (1) the enclosed survey and (2) informed consent statement. This survey should be completed during class time. Allow 15 minutes for completion. Once everyone has completed his/her survey, place them back in the envelope and return to your department chair. Note: If upon receiving this packet you do not have another exam scheduled until the final exam, distribute immediately and ask the students to use the most previous exam score.

Due to time constraints, these surveys should be administered at your earliest convenience.

Department chairs: Please contact me once all packets have been returned so I may collect them, or you may mail through the college mail to Jacob Dasinger at the George County Center at your earliest convenience.

PLEASE READ OUT LOUD TO CLASS: You are being asked to participate in a study designed to determine causal attributions of students in Intermediate Algebra at Mississippi Gulf Coast Community College. No activity is required from you outside of class. Participation is completely voluntary and may be discontinued at any time without penalty or prejudice. Participation is not required for enrollment in Intermediate Algebra at Mississippi Gulf Coast Community College. The entire survey should take no longer than 15 minutes.

You have just been distributed 2 forms: an informed consent statement for which you can detach and keep, and a self-report survey which you are to complete. Please complete the self-report survey honestly and as to best of your abilities. DO NOT WRITE ANYTHING IN THE RECORD BOXES. DO NOT WRITE YOUR NAME, STUDENT IDENTIFICATION NUMBER, SOCIAL SECURITY NUMBER, OR ANY OTHER IDENTIFICATION RECORD ON THE SURVEY. All surveys will be kept confidential and no names will be collected. Once data is collected and entered, all surveys will be destroyed. Thank you for your time and participation.

APPENDIX C

INFORMED CONSENT STATEMENT



INFORMED CONSENT STATEMENT

Causal Attributions of Nontraditional Students
in a Developmental Mathematics Course at a Two – Year College

You are being asked to participate in a study designed to determine causal attributions of students in Intermediate Algebra at Mississippi Gulf Coast Community College. This survey will take place during regularly scheduled class time. No activity is required from you outside of class. Participation in this survey is not a requirement for this course and is not required for enrollment in Intermediate Algebra at Mississippi Gulf Coast Community College.

The research consists of completing four parts of a survey: demographic data, a questionnaire to determine your status as traditional or nontraditional student, a self-report question about an exam grade followed by two short answer questions, and the Revised Causal Dimension Scale. The entire survey should take no longer than 15 minutes. Participation is completely voluntary and may be discontinued at any time without penalty or prejudice.

This research has no foreseeable risk for participants. However, participation may lead to a better understanding of student attributions of grades and may improve the overall quality of education. All surveys will be kept confidential and no names will be collected. Once data is collected and entered, all surveys will be destroyed. If you have any questions about the study or procedures, you may contact the researcher, Jacob Dasinger, at Mississippi Gulf Coast Community College, P.O. Box 77, Lucedale, MS, 39452, or at (601) 766-6455.

This project has been reviewed by the Human Subjects Protection Review Committee, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research subject should be directed to the chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5147, Hattiesburg, MS 39406-0001, (601) 266 – 6820.

This project has also been approved by Dr. Willis H. Lott, President, Mississippi Gulf Coast Community College, P.O. Box 548, Perkinston, MS 39753, (601) 928 – 6280.

If you choose to participate, please detach this form from the survey and keep for your records. Only return the completed survey to your instructor.

APPENDIX D

SURVEY WITH REVISED CAUSAL DIMENSION SCALE

Causal Attributions of Nontraditional Students
in a Developmental Mathematics Course at a Two – Year College

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Record #:

Sex: Male Female

Ethnicity: Caucasian African-American Hispanic Asian-American Other

Age: _____

Circle the appropriate response:

1. Did you enroll in college the same year you graduated high school/received GED?

Yes No

2. Are you a part-time student (currently enrolled in less than 12 semester hours)?

Yes No

3. On average, do you work more than 35 hours a week?

Yes No

4. Are you considered financially independent* when evaluated for financial aid?

Yes No

*Financially independent students are one of the following: (1) 24 years or older by Dec. 31 of the award year; (2) an orphan, ward of the court, or ward of the court until 18; (3) a veteran of the Armed Services; (4) a married individual; (5) have legal dependents other than a spouse; (6) independent due to unusual circumstances as determined by a financial aid administrator.

5. Do you have dependents other than a spouse?

Yes No

6. Are you a single parent?

Yes No

7. Did you obtain a GED or completion certificate instead of a high school diploma?

Yes No

8. What was the numerical score (not letter grade) you made on the exam you just recently received?

_____ / 100

Note: If your exam score was not out of 100, please fill in:

(score) _____ / _____ (total possible points)

9. Do you consider the score reported on Question 8 to be successful, unsuccessful, or no opinion?

Successful

Unsuccessful

No opinion

- 10a. In your own words, describe the one or more reasons you made the score reported on Question 8.

Please turn over to complete the survey

10b. In your opinion, what is the **one main reason** you made the score reported on Question 8.

Causal Dimension Scale (CDSII)

Instructions: Think about the reason you have written on Question 10b above. The items below concern your impressions or opinions of this cause for your performance. Circle one number for each of the following questions.

Is the cause something:

- | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|--|
| 1. that reflects an aspect of yourself | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | reflects an aspect of the situation |
| 2. manageable by you | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | not manageable by you |
| 3. permanent | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | temporary |
| 4. you can regulate | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | you cannot regulate |
| 5. over which others have control | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | over which others have no control |
| 6. inside of you | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | outside of you |
| 7. stable over time | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | variable over time |
| 8. under the power of other people | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | not under the power of other people |
| 9. something about you | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | something about others |
| 10. over which you have power | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | over which you have no power |

- | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|--|
| 11. unchangeable | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | changeable |
| 12. other people
can regulate | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | other people
cannot regulate |

APPENDIX E

PERMISSION TO USE REVISED CAUSAL DIMENSION SCALE (CDSII)

Jacob Dasinger

From: "jacob dasinger" <jacob.dasinger@mgccc.edu>
To: <jacob.dasinger@comcast.net>
Sent: Monday, July 18, 2011 11:11 AM
Subject: FW: Request for reprint of Revised Causal Dimension Scale (CDSII)
From: Russell, Daniel W [HD FS] [drussell@iastate.edu]
Sent: Monday, February 14, 2011 1:31 PM
To: jacob dasinger
Subject: RE: Request for reprint of Revised Causal Dimension Scale (CDSII)

Jacob:

You have my permission to use the CDSII in your dissertation research; my only request is that you send me a summary of your findings once you have completed your research.

Good luck,

Dan

Daniel W. Russell, Ph.D.
Professor, Department of Human
Development & Family Studies
Iowa State University
(515) 294-4187
Fax: 294-2502

From: jacob dasinger [mailto:jacob.dasinger@mgccc.cc.ms.us]
Sent: Monday, February 14, 2011 11:38 AM
To: 'Russell, Daniel W [HD FS]'
Subject: RE: Request for reprint of Revised Causal Dimension Scale (CDSII)

Dr. Russell,

Thank you for all your help so far with the CDSII. I would like to formally request permission to use the Revised Causal Dimension Scale (CDSII) in my dissertation. A response to this email should suffice. Thank you again!

Jacob Dasinger, A.B.D.
Mathematics Instructor
Co-Advisor Beta Tau Eta Chapter
Phi Theta Kappa
MGCCC George County Center
601-766-6455
jacob.dasinger@mgccc.edu

APPENDIX F

HUMAN SUBJECTS REVIEW COMMITTEE LETTER



THE UNIVERSITY OF SOUTHERN MISSISSIPPI

Institutional Review Board

118 College Drive #5147
 Hattiesburg, MS 39406-0001
 Tel: 601.266.6820
 Fax: 601.266.5509
 www.usm.edu/irb

**HUMAN SUBJECTS PROTECTION REVIEW COMMITTEE
 NOTICE OF COMMITTEE ACTION**

The project has been reviewed by The University of Southern Mississippi Human Subjects Protection Review Committee in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
 - The risks to subjects are reasonable in relation to the anticipated benefits.
 - The selection of subjects is equitable.
 - Informed consent is adequate and appropriately documented.
 - Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
 - Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
 - Appropriate additional safeguards have been included to protect vulnerable subjects.
 - Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
 - If approved, the maximum period of approval is limited to twelve months.
- Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 11022402

PROJECT TITLE: **Causal Attributions of Nontraditional Students in a Developmental Mathematics Course at a Two-Year College**

PROPOSED PROJECT DATES: 03/01/2011 to 12/31/2011

PROJECT TYPE: **Dissertation**

PRINCIPAL INVESTIGATORS: **Jacob Arthur Dasinger**

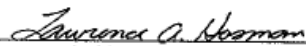
COLLEGE/DIVISION: **College of Science & Technology**

DEPARTMENT: **Science & Mathematics Education**

FUNDING AGENCY: **N/A**

HSPRC COMMITTEE ACTION: **Expedited Review Approval**

PERIOD OF APPROVAL: 03/01/2011 to 02/29/2012


 Lawrence A. Hosman, Ph.D.
 HSPRC Chair

3-2-2011
 Date

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